REMARKS

Applicants amended claims 1-30, 47, and 51-54. No new matter has been added. Claims 1-54 are presented for examination.

The invention relates to batteries having good service life, for example, when discharged continuously. The good service life is provided by including a high interface area between a cathode and an anode in the battery.

One way to provide a relative measure of the interface area between the anode and the cathode is to approximate the "effective thickness" of the cathode. For a particular battery, e.g., a AA battery, the smaller the cathode thickness, the greater the interface area per cathode volume. The relative effective thickness of a cathode can be estimated by using the expression $(S/V)^2$, where S is the separator surface area, and V is the cathode volume.

Claims 1-46 and 51-54 are directed to batteries having certain $(S/V)^2$ values. For example, claim 1 recites a primary alkaline AA battery having an $(S/V)^2$ value of greater than 0.38, i.e., $(S/V)^2 > 0.38$. In other words, **claims 1-46 and 51-54 recite Applicants' recognition that, in batteries with good service life, there is a relationship or dependency between two variables, namely, S and V**. For example, in claim 1, $S > (0.38)^{1/2}V$.

Claim Rejections - 35 U.S.C. §112

The Examiner rejected claims 1-46 and 51-54 under 35 U.S.C. §112, second paragraph, as being indefinite. As suggested by the Examiner, Applicants amended claims 1-30 and 51-54 to provide units for $(S/V)^2$ and to provide antecedent basis in claims 51 and 53.

The Examiner also asserted that claims 51-54 are indefinite because they recite the limitations "above Plot A" or "above Plot B" in reference to Figure 8 of Applicants' specification. Applicants amended claims 51-54 by duplicating a portion of Figure 8 into the claims. (MPEP 2173.05(s)).

Accordingly, Applicants request that the rejection under 35 U.S.C. §112, second paragraph, be withdrawn.

Claim Rejections - 35 U.S.C. §103

JP 7-326370 (JP '370)

Claims 1-39 and 47-54 were rejected under 35 U.S.C. §103(a) as being unpatentable over JP '370.

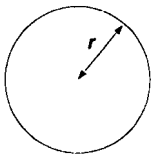
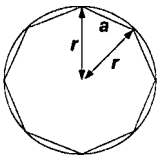
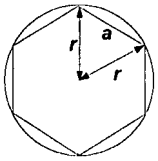
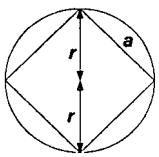
The Examiner, however, acknowledged that JP '370 does not explicitly teach the claimed $(S/V)^2$ values. In fact, JP '370 does not recognize any relationship between the separator surface area and the cathode volume, as required by the claims.

Nevertheless, while conceding that the claimed $(S/V)^2$ values would not necessarily be inherent in the batteries of JP '370, the Examiner maintained that an artisan would have sufficient motivation to use large surface area separators that would result in $(S/V)^2$ value falling within the claimed ranges.[1] Applicants disagree and submit that, indeed, in some circumstances JP '370 **teaches away** from increasing the surface area of the separator.

JP '370 is directed to creating a space in a battery between a separator and a cathode so that the battery can retain a large volume of electrolyte, e.g., compared to a battery having a cylindrical separator with a circular cross section, thereby decreasing polarization and improving performance.[2] To create the space, JP '370 discloses using separators that have a knurled surface, a wavy surface, or a cross section that is polygonal, such as tetragonal, hexagonal, or octagonal.

Referring to the table below, keeping in mind that the objective in JP '370 is to maximize the space between the separator and the cathode, data from JP '370 show that both the volume of electrolyte and the discharge performance of a battery improve in going from a separator with an octagonal cross section, to a hexagonal cross section, to a tetragonal cross section. Thus, in light of the disclosure of JP '370, an artisan reading JP '370 would be motivated to use a separator with a tetragonal cross section because the tetragonal cross section provides the largest volume of electrolyte and the best discharge performance.

[1] See ¶4 of the Office Action.
[2] See, e.g., JP '370 at [0005] (translation enclosed).

				
Type of Separator	Reference	Octagonal	Hexagonal	Tetragonal
Surface Area (S.A.) of Separator (h = height of the separator)	$S.A. = 2\pi rh$ $S.A. \approx 6.28rh$	$a = 2r \sin 22.5°$ $a \approx 0.765r$ $S.A. = 8ah$ $S.A. \approx 6.12rh$	$a = r$ $S.A. = 6rh$	$a = \sqrt{2}r$ $S.A. = 4\sqrt{2}rh$ $S.A. \approx 5.65rh$
Volume of Electrolyte (Table 1 of JP '370)	100.0 (reference)	104.0	111.4	112.4
Discharge Performance at 2.2 Ω Continuous Discharge (Table 1 of JP '370)	21.5 hrs	22.5 hrs	22.9 hrs	23.1 hrs

However, as revealed by Applicants' calculations above, an artisan practicing the disclosure of JP '370 would actually be **decreasing** the surface area of the separator (e.g., from about 6.28rh to about 5.65rh). This is contrary to the Examiner's assertion that the artisan would be motivated to use large surface area separators. Thus, not only does JP '370 not disclose or suggest the claimed $(S/V)^2$ values, JP '370 provides no definitive teaching to increase separator surface area.

With regard to claims 47-49, JP '370 does not disclose or suggest a second electrode within a first electrode (e.g., a cathode), wherein the first electrode contacts an entire surface of a separator, as claimed. As evident from the goal in JP '370 to produce a space between the separator and the cathode, the cathode does not contact an entire surface of the separator.[3]

Accordingly, Applicants request that the rejection over JP '370 be reconsidered and withdrawn.

[3] See, e.g., JP '370 at Figures 3-6.

U.S. Patent No. 5,869,205 (Mick)

Claims 1-33, 40-46, 53 and 54 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mick.

As with JP '370, the Examiner acknowledged that Mick does not explicitly teach the $(S/V)^2$ values of a battery. The Examiner also conceded that the claimed $(S/V)^2$ ranges would not necessarily be inherent in the batteries of Mick.[4]

Nevertheless, the Examiner asserted that an artisan would have sufficient motivation to use large surface area separators that would result in $(S/V)^2$ values falling within the claimed ranges.[5] Applicants disagree.

Mick, and the Examiner's assertion, only address one element of what Applicants are claiming, namely, separator surface area. That is, assuming *arguendo* that Mick suggests increasing the surface area of the separator (S), Mick does not suggest modifying the separator surface area in relation to the cathode volume (V) to provide the claimed values. Again, pending claims recite a relationship between S **and** V, but Mick does not disclose this relationship.

Accordingly, Applicants request that that the rejection over Mick be reconsidered and withdrawn.

Conclusion

Assuming *arguendo* that the Examiner's characterization of the cited reference is accurate, **at best** Mick merely discloses batteries having increased separator surface area (S), not an S selected in relation to V. Neither Mick nor JP '370 recognize the relationship between S **and V**, so neither discloses or suggests batteries having the claimed $(S/V)^2$ values.

Applicants submit that the claims are in condition for allowance, which action is requested. Attached is a marked-up version of the changes being made by the current response.

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[4] See ¶5 of the Office Action.
[5] Id.

Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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